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PHOTOGRAPHIC INTERPRETATION REPORT



INTRODUCTION TO THE KRUG INSTALLATION SERIES

DECLASS REVIEW by NIMA/DOD

OCTOBER 1961

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PHOTOGRAPHIC INTERPRETATION REPORT

INTRODUCTION TO THE KRUG INSTALLATION SERIES

OCTOBER 1965

NATIONAL PHOTOGRAPHIC INTERPRETATION CENTER

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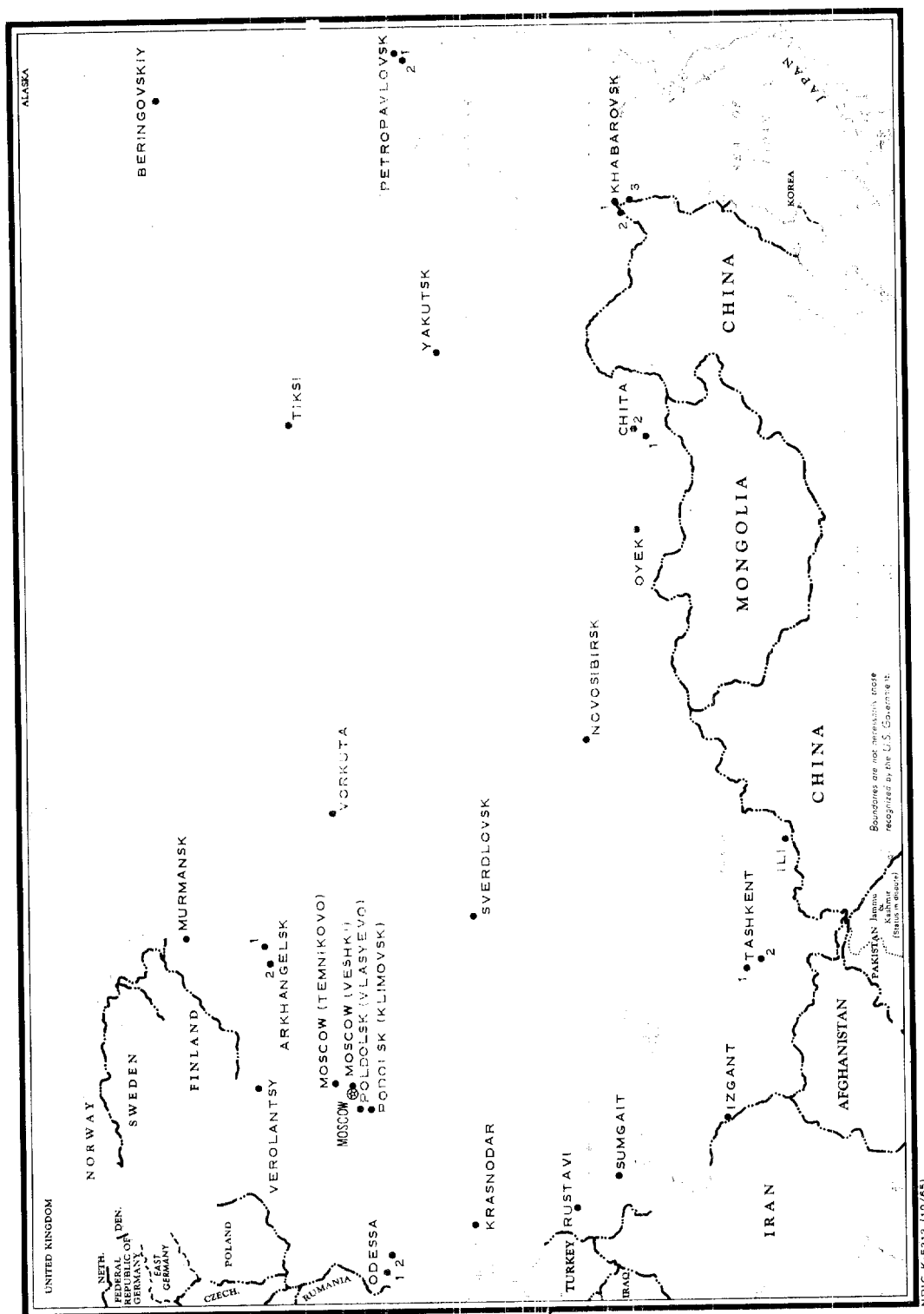


FIGURE 1. LOCATIONS OF KRUG INSTALLATIONS, USSR.

NPIC K-8212 (10/85)

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This report introduces an NPIC series on Soviet-type KRUG high-frequency direction-finding (HF DF) antenna array installations. The series will consist of short but detailed individual reports using a standard format, covering all 31 installations containing KRUG antenna arrays which have been identified by [REDACTED]

[REDACTED] on photography (Figure 1), and all additional KRUG installations identified on future photographic missions. Each report will be based on the best of the latest photographic coverage available. It is proposed that when significant changes are identified on photography, superseding reports will be issued.

The standard KRUG HF DF antenna array (Figures 2 and 3) is composed of several concentric circles with a building approximately 50 by 35 feet at the center. One of the circles is approximately 390 feet in diameter and consists of 40 evenly spaced, cage-type, vertical antenna elements. Each of these antenna elements is 30 feet high [REDACTED]

Within the circle of cage-type antenna elements is a circular reflector screen. The reflector screen is approximately 350 feet in diameter and is supported by 38 pole masts.

All of the sites have a probable ground reflector ring (not shown on figures) approximately [REDACTED] and all but one (Murmansk) are enclosed by a low fence approximately 980 feet in diameter.

Capabilities of the KRUG Antenna

The KRUG array is a versatile antenna system that can be adapted to perform a variety of functions. A partial listing of these reported functions 1/ includes:

1. Long-range aid to air navigation
2. Air traffic control
3. Communications intercept, both foreign and domestic

4. HF communications reception, particularly where high directivity is needed
5. Tracking of satellites which carry HF beacons or transmitters
6. Detection of nuclear detonations
7. Detection of missile launches
8. HF propagation forecasting
9. HF propagation research
10. HF ionosphere (over-the-horizon) radar

Technical Characteristics

Frequency. 2 - 20 mcs
 Range. 5,000 nautical miles (nm)
 Bearing 360 degrees
 Accuracy 1.0 degree

Accuracy of bearings is believed to be plus or minus one half of a degree at a distance in excess of 6,000 nm under favorable conditions. The KRUG is believed capable of simultaneously tracking multiple targets transmitting on different frequencies in the HF portion of the spectrum and of "D/F-ing" transmissions as brief as 50 milliseconds duration. 1/

Each report will include basic data on the installation, set in boxes at the top; a brief but comprehensive photographic interpretation of the installation; and an annotated photograph from the referenced mission. Notes on the items included in the basic-data boxes are given below:

Installation Name. Installations will be carried by Target Data Inventory (TDI) or Bombing Encyclopedia (BE) names unless these conflict with NPIC usage.

Geographic Coordinates. Coordinates will be given in degrees, minutes, and seconds as plotted by NPIC on the referenced map or chart, usually the Series 200 US Air Target Chart.

NPIC Target Number and BE Number. Each of these is unique to the installation and consists of the WAC number plus identifying digits.

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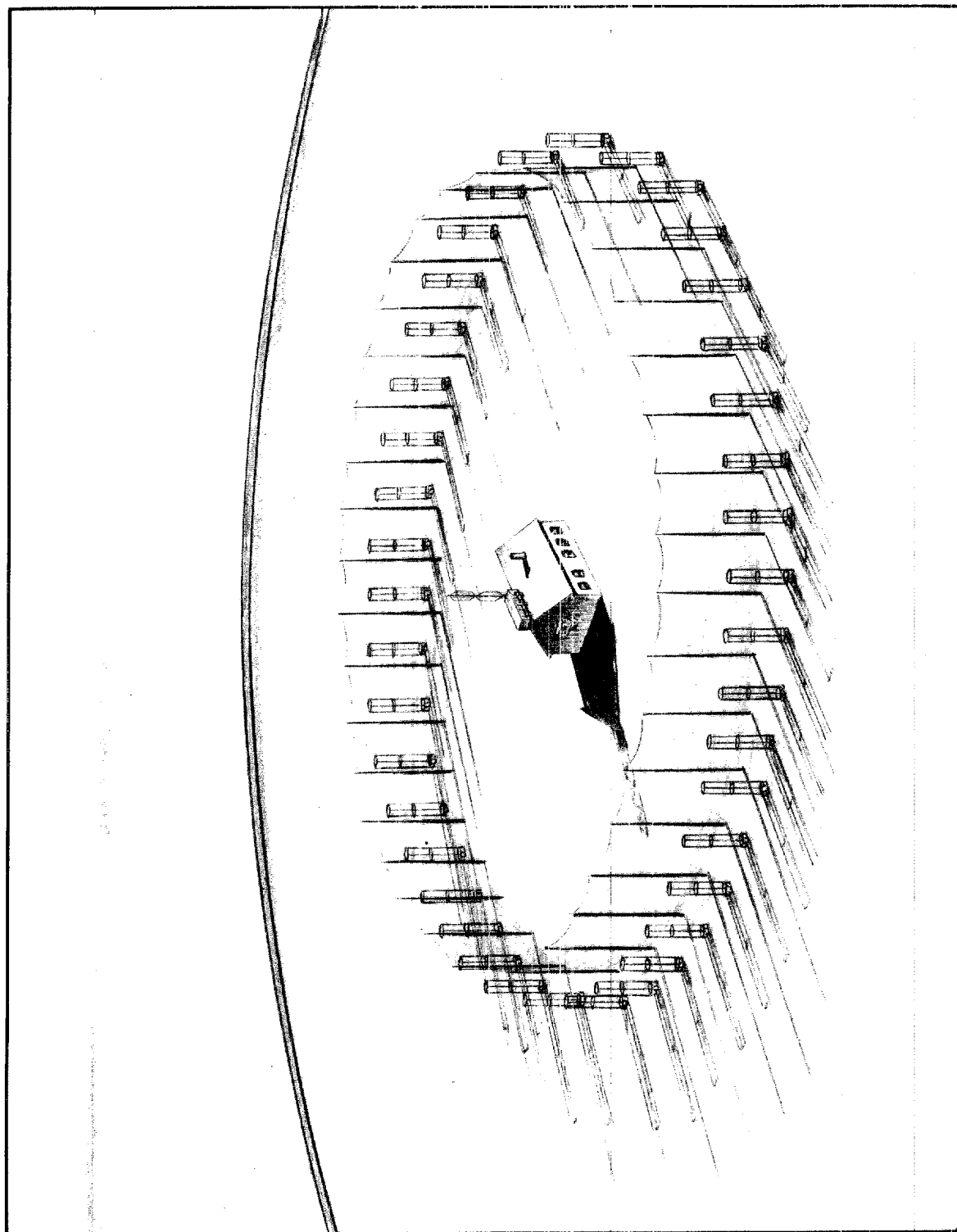


FIGURE 2. PERSPECTIVE DRAWING OF A TYPICAL KRUG INSTALLATION.

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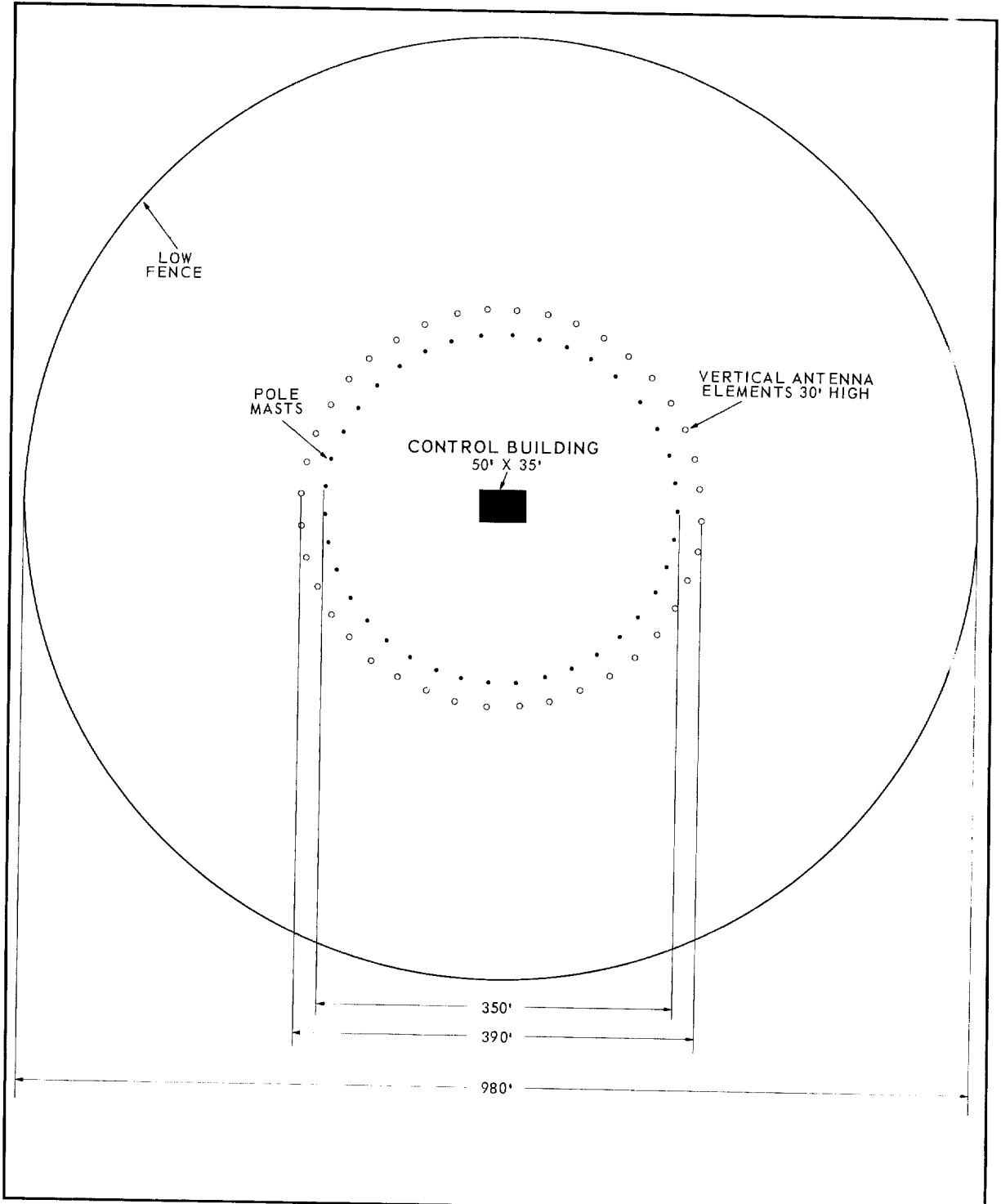


FIGURE 3. DIMENSIONAL DRAWING OF A TYPICAL KRUG INSTALLATION.

NPIC K-8214 (1/3/65)

Photography. This box contains full photographic references for the coverage on which the report is based. These include mission number, date of pass, pass number, camera designation (where applicable), frame number, index number (for [] Universal Grid No 1 coordinates, weather, limiting conditions (if any), and classification.

AD Area. This box contains a tag identifying the air defense (AD) area in which the installation is located. The tag is based on a system devised by NSA which divides the USSR as shown in Figures 4 through 7.

The first element of the tag, the letter F, indicates an electronic installation. The second element, also a letter, indicates the air defense district in which the installation is situated, as follows:

Letter	District
M	Leningrad
K	Western
U	Moscow
P	Southwestern
F	Baku
W	Sverdlovsk
N	Tashkent
Y	Northern
D	Trans-Siberian
E	Far Eastern

These districts have in turn been divided into zones as indicated by the first digit in the tag, and further subdivisions are indicated by the second digit.

Only a 2-letter country indicator will be used in the box when installations lie outside the USSR.

References. This box contains data on the map or chart used for plotting the location of the installation and a citation of this introductory report.

Requirement. This box contains the requester's requirement number.

Descriptive Information. In addition to the items covered in the boxes at the head of the report, as much description of the installation as possible will be given. The subject headings in this section were selected after detailed evaluation of a number of individual facilities to ensure a comprehensive profile of any given facility. These headings will always occur in the same order; when any particular category does not apply to a given situation, it will be omitted. This omission indicates only non-applicability; negative information, such as the absence of security measures or the lack of activity, will be noted when observed. The information that will be included under some of these headings is explained below; the other headings are self-explanatory but are included to indicate their place in the standard order of entries and also to suggest the broad scope of photographic interpretation that will be accomplished for each facility. All measurements must be considered approximate.

Location. The distance and direction from the town the installation was named for.

Function.

Status.

Activity.

Support Components. The buildings and structures in the immediate vicinity of the operational components will be listed here. Usually they will not be annotated on the photograph.

Security.

Vegetation & Terrain.

Support Facilities. This entry describes a separate support facility other than the support components situated in the immediate vicinity of the operational elements of the installation and already described above.

Associated Facilities.

Unusual Features.

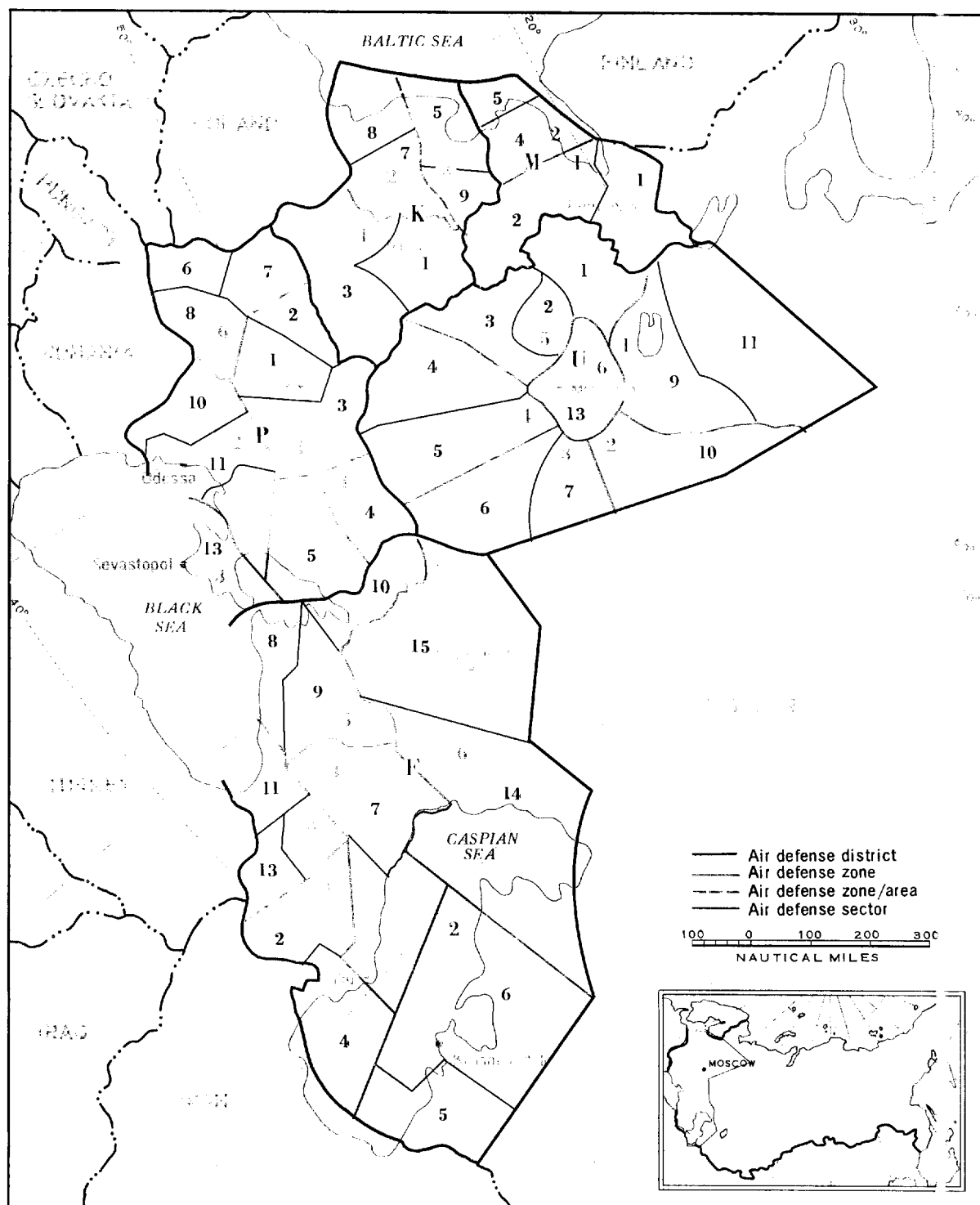


FIGURE 4. WESTERN AIR DEFENSE AREAS, USSR.

NPIC K-521 (10/65)

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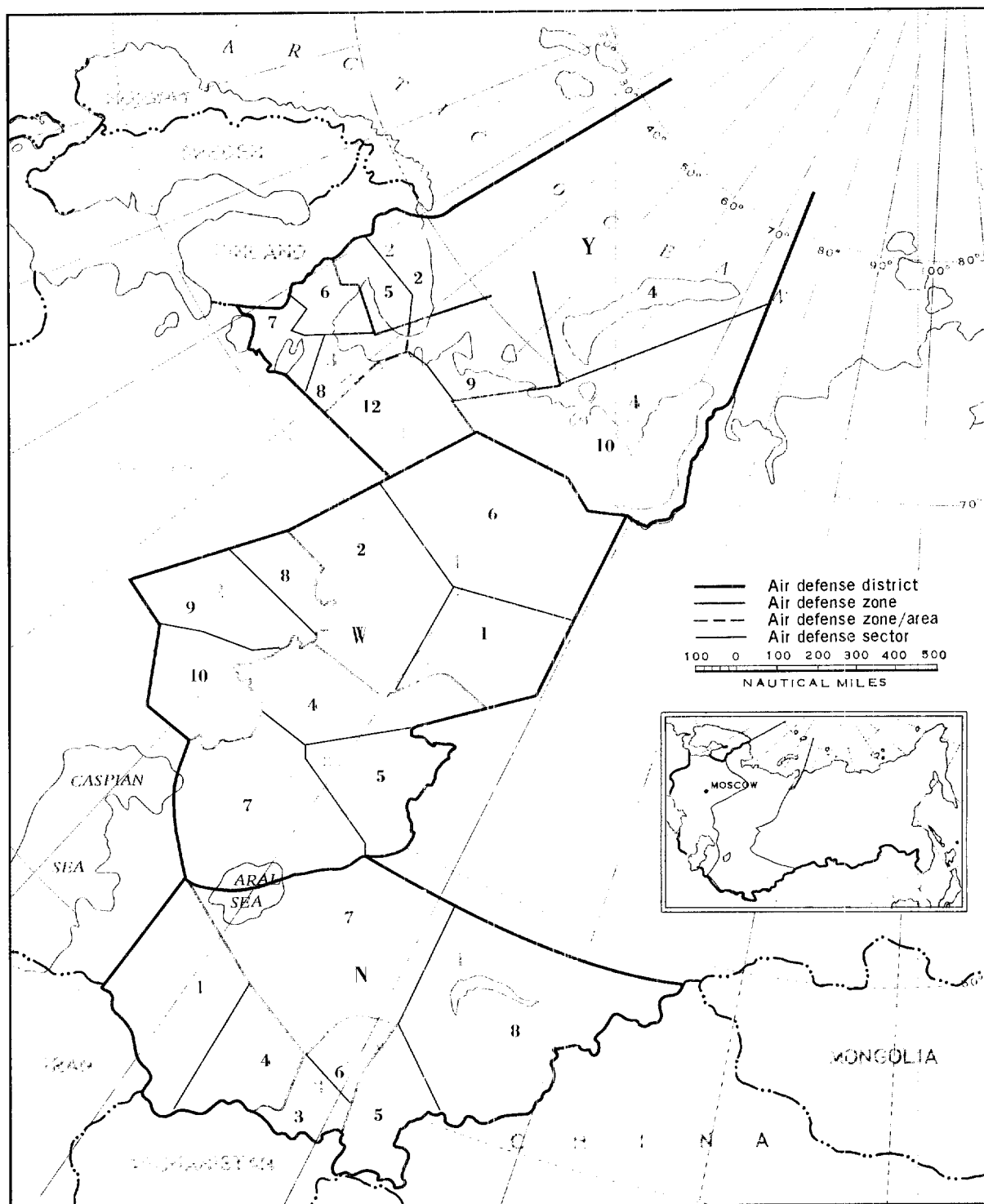


FIGURE 5. SVERDLOVSK, TASHKENT, AND NORTHERN AIR DEFENSE AREAS, USSR.

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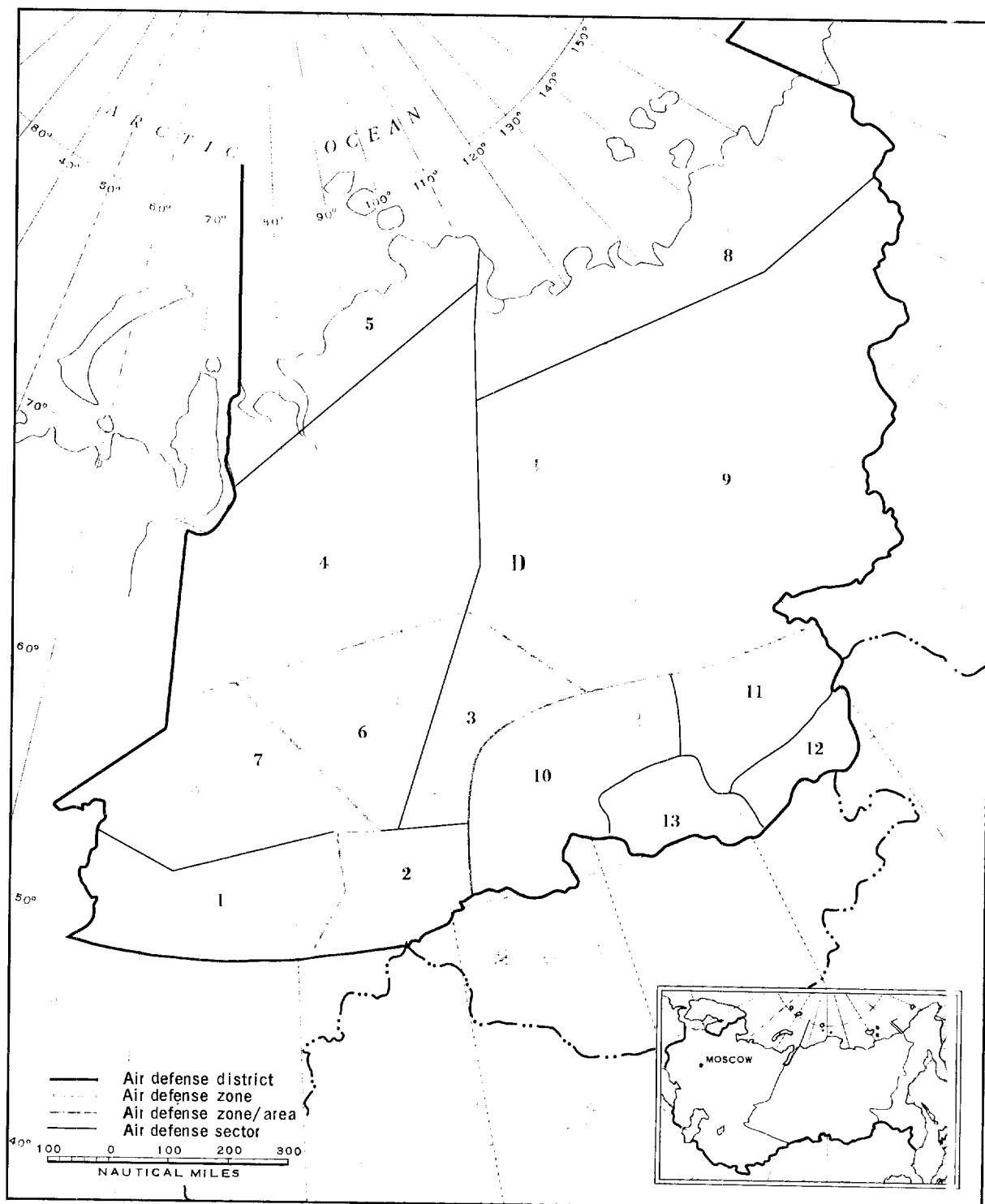


FIGURE 6. TRANS-SIBERIAN AIR DEFENSE AREA, USSR.

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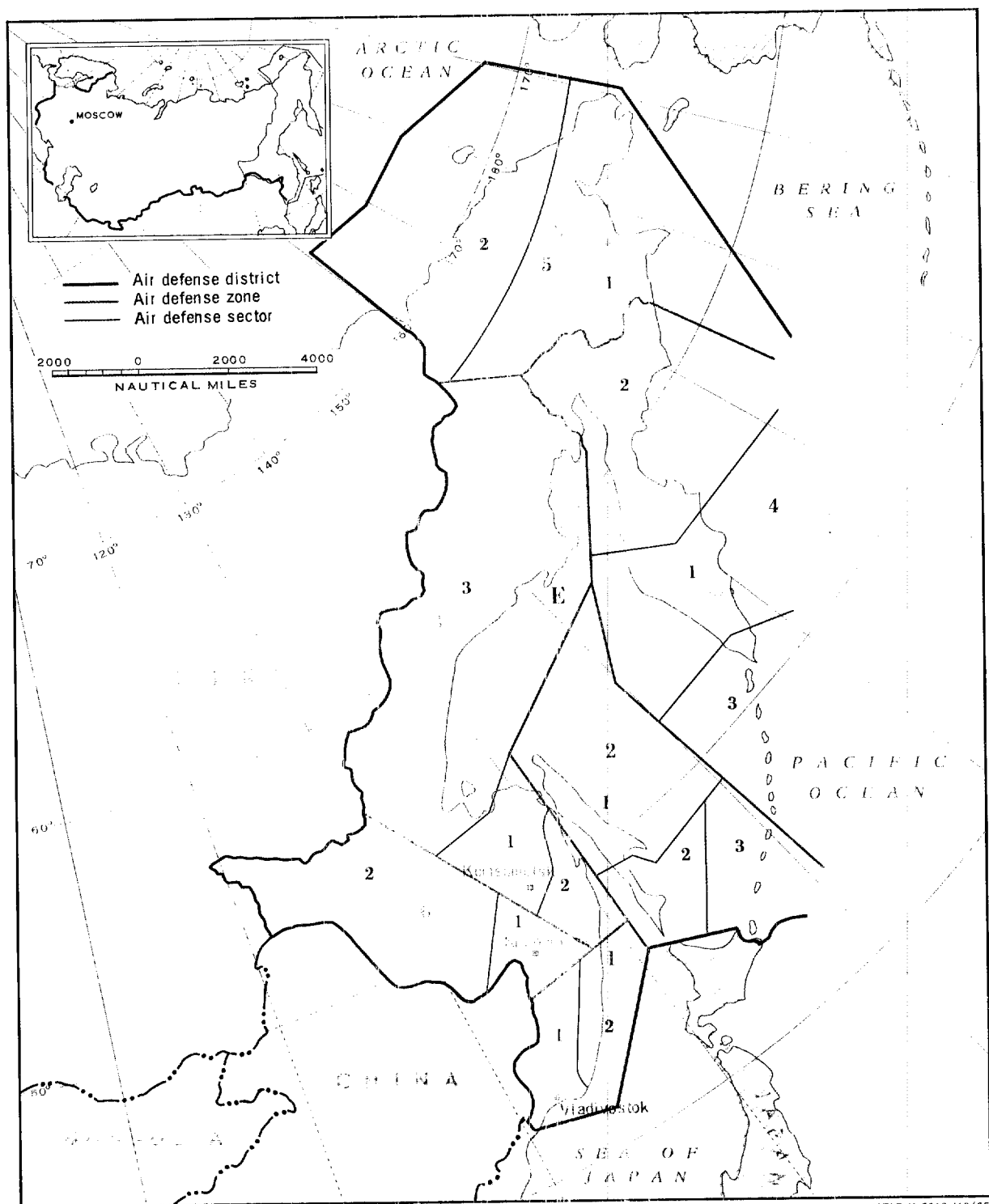


FIGURE 7. FAR EASTERN AIR DEFENSE AREA, USSR.

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REFERENCES

DOCUMENT

1. North American Air Defense Command, "Possible Transportable KRUG Could Improve Soviet HF-D F-ing Capabilities Significantly," *NORAD Weekly Intelligence Review*, 49, 64, 4 Dec 64, pp 2-4 (SECRET)

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MAPS OR CHARTS

CIA. Map 34721, 5-64 (SECRET)

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REQUIREMENT

NSA. P0432/R11-65

NPIC PROJECT

11012/66 (partial answer)

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